CAR CARE GUIDE

SECTION 2. ROUGH IDLE

"Why Does My Engine Keep Stalling?"

There are probably 50 different reasons why gasoline engines will start and stall, or will start and idle roughly. Included are all of the following:

- A plugged positive-crankcase-ventilation (PCV) valve.
- A stuck thermostatic air-cleaner-assembly damper valve.
- A leaking exhaust-gas-recirculation (EGR) valve.
- A stuck early-fuel-evaporation (EFE) valve or manifold heat-control valve.
- Faulty sparkplugs.
- Water in gasoline.
- A vacuum leak at the base of the carburetor.
- A weak fuel-injection delivery system.

Faulty sparkplugs, vacuum leaks and contaminated gasoline are some obvious causes of rough idle and stalling. Water in gasoline is an old problem, but this is not as common as it once was, particularly in populated areas, where fuel is quickly pumped from storage tanks.

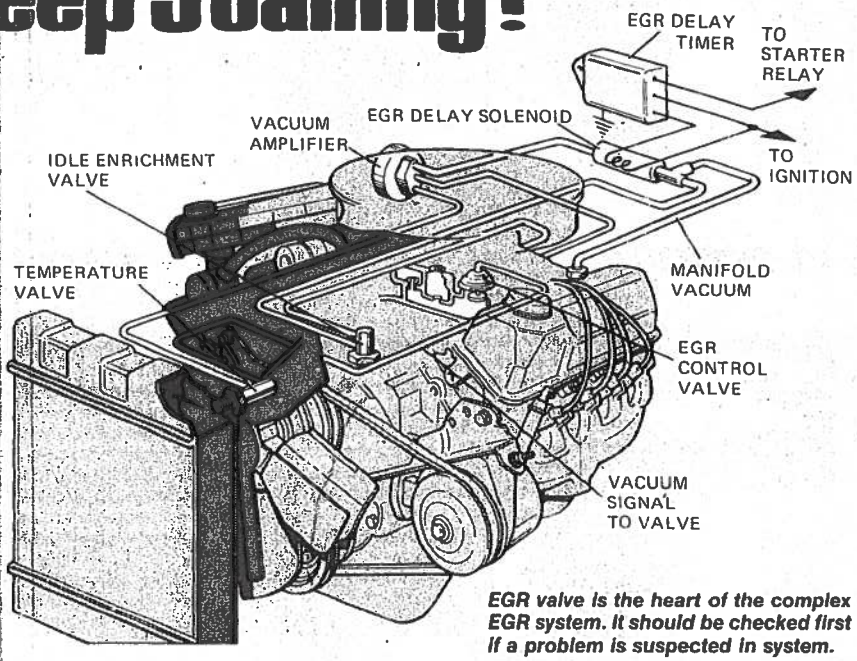
But how about some of those "new" causes—like the first four on the list? Each of them is part of an emission-control system, and practically every car built in the United States during the 1970s and '80s is equipped with them.

Among the dozens of other reasons why an engine stalls or idles roughly are the following:

- Percolation and vapor lock.
- Incorrect ignition timing (Section 6).
- Faulty ignition-system part(s).
- Disconnected vacuum hose (Section 3).
- Incorrect carburetor idle speed or fast-idle adjustment (Section 3).
- A defect in the automatic-choke system (Section 1).
- Partially clogged fuel filter (Section 1).
- Weak fuel pump (Section 9).
- Dirty carburetor.

How to check the PVC system

The PCV system provides ventilation of crankcase gases into the engine's intake manifold. To prevent these gases from interfering with combustion, they are allowed into the engine only when it's burning large amounts of fuel and air. The PCV valve is inserted somewhere in the line that connects the crankcase to the intake manifold. When intake manifold vacuum is high at idle or part-throttle, low-speed operation, the PCV valve is held in a closed position and crankcase vapors are kept out of the intake manifold. When vacuum drops at greater throttle openings, the crankcase pressure overcomes the manifold vacuum acting on the valve, and vapors enter the intake manifold where the hydrocarbon content is drawn into the engine and burned. Fresh air is drawn into the crankcase through a filter or through a hose to a filter within the air cleaner. This keeps pressure in the crankcase from falling below atmospheric, which would inhibit the flow of the crankcase vapors into the intake manifold.



EGR valve is the heart of the complex EGR system. It should be checked first if a problem is suspected in system.

A faulty PCV valve is more likely to cause rough idling than stalling, since the valve is supposed to be fully closed during idle when intake vacuum is high. If the valve doesn't close, an excessive amount of vapor flowing to the cylinders will lean out the fuel mixture, and the engine will stutter. To check the system:

1. Find the PCV valve, which on four- and six-cylinder engines is usually located in the cam or rocker-arm cover. On V8 engines, the valve is found (depending on the engine) in the intake manifold, pushrod cover, valley cover under the intake manifold, rocker cover or oil-filler cap.

2. Pull the valve from its seat (leaving it connected to its hose) and shake it. If it doesn't rattle, it's plugged. Replace it.

3. However, even if the valve rattles, it may still be defective. To find out, run the engine at idle and close the valve opening tightly with your finger. If you don't feel a strong suction, the valve or vacuum hose is probably bad.

4. Check the hose for splits. Make sure it's connected tightly to the vacuum port on the engine. Then pull the valve off the hose and, with engine running, cover the end of the hose with paper. If the pull isn't strong, the hose is probably clogged. Replace it. If hose is okay, replace the valve.

5. The PCV filter is an essential part of the whole system. Most cars have the filter positioned on the carburetor air cleaner. Check to see that the filter is clean. If not, replace it.

Some AMC and Chrysler engines have the PCV filter in the oil-filler cap and crankcase-inlet breather, respectively. Rinse these parts in solvent and allow them to air-dry.

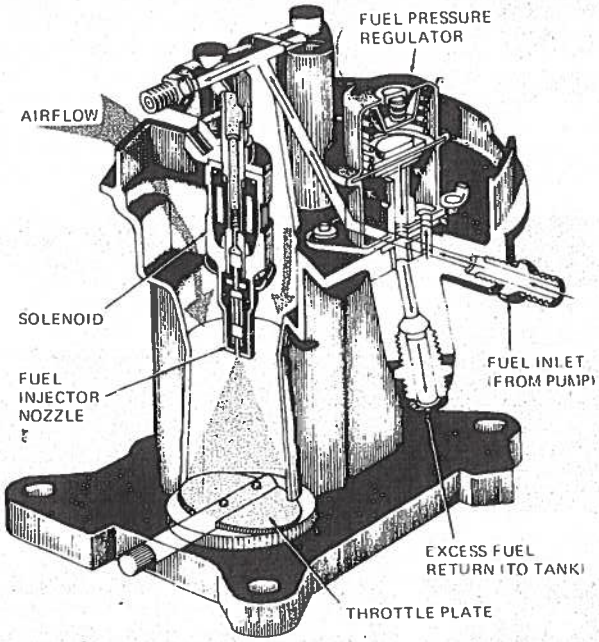
How to test a damper valve

When you start a cold engine, the damper valve in the snout of the thermostatic air cleaner is supposed to close and allow air entering the carburetor to be preheated. Preheated air is necessary to maintain good cold-engine driveability while permitting the leaner carburetor and choke calibrations called for by emissions standards. As the engine warms up, reducing the need for preheated air, the damper valve is supposed to open.

If something goes wrong with the thermostatic air-cleaner temperature sensor or vacu-

(Please turn to page 151)

CAR CARE GUIDE
SECTION 2.



Stalling in a car with GM's Throttle Body Injection system could be caused by insufficient fuel pressure. To check it, remove the fuel line at the inlet and attach a pressure tester.

(Continued from page 148)

um motor and the damper valve fails to close or open, stalling or rough idling results. Check the operation of the valve as follows:

1. If the engine stalls or idles roughly when cold, remove the duct over the air-cleaner snout, if there is one, so you can observe the valve. If you have trouble seeing the valve, hold a mirror at the snout opening as you shine a flashlight into the opening.

2. Start the engine, which should be cold. The valve should close. If it doesn't, turn off the engine and pull the vacuum hose from the vacuum motor, which is on top of the snout. Then, connect a handheld vacuum pump to the vacuum motor. Apply at least 7 in. Hg of vacuum. (You may, instead, pull the vacuum hose from its place on the air cleaner and connect the vacuum pump to the end of the hose.)

3. If the valve closes, the sensor inside the air cleaner is bad. Replace it. If the valve doesn't close, the vacuum motor is bad. Replace it.

4. If the engine stalls or idles roughly when warm, check the valve in the same way, but with the engine warm. If the valve is not open, the sensor is probably shot. Replace it.

What you should know about EGR

The EGR valve is thought to cause more stalling and rough-idling problems when the engine is cold than any other emission-control component. After it was introduced in the early seventies and for a few years thereafter, it probably did. Now, however, the EGR system has been perfected and it causes no greater or lesser amount of stalls and rough idling than other components.

The purpose of the EGR system is to divert a portion of engine exhaust gases back into the cylinders to lower high combustion temperatures that produce too much nitrogen oxide (NOx). The valve also prevents detonation. Eliminating it can ruin an engine. When the engine is cold, the EGR system is not supposed to operate. If it did, the engine would stall or idle badly. It operates primarily when an engine is warm and at part throttle—when conditions are ripe for NOx production and detonation.

Yet when the engine is cold, EGR valves cause the most problems. A leaking valve lets exhaust gases seep into the cylinders when they aren't supposed to be there. Gases lean out the fuel mixture and can stall an idling engine or, at best, cause rough idle.

(Please turn to page 152)

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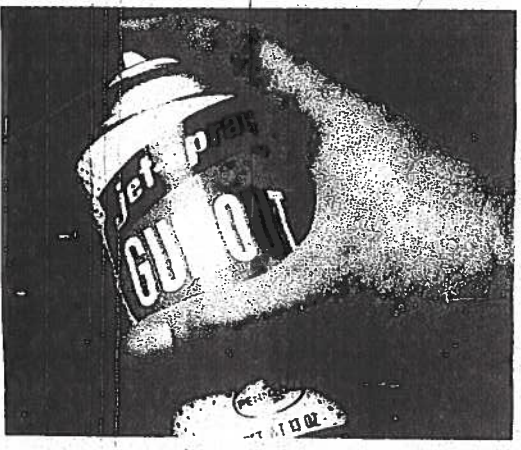

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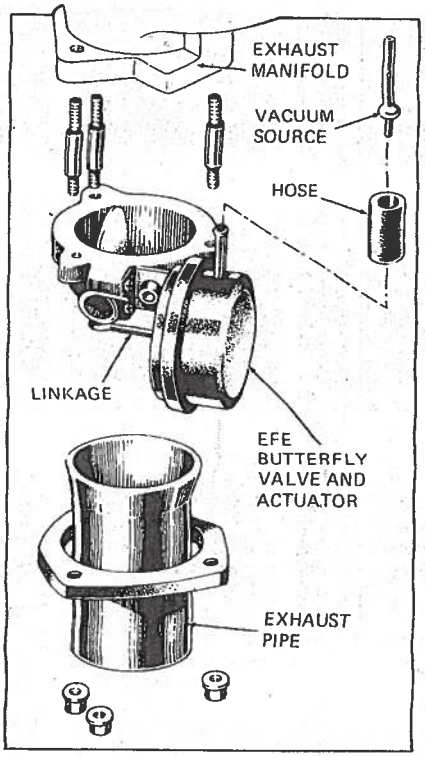
CAR CARE GUIDE

SECTION 2

(Continued from page 151)

Depending on the engine, an EGR system may be very simple or very complex. All systems have an EGR valve (there are different types) and vacuum hoses, and may have one or all of the following components: a coolant-temperature control switch, vacuum reservoir, vacuum amplifier and vacuum delay switch.

Procedures for checking most systems are lengthy, preventing us from giving how-to details. However, the weakest link in the system is the EGR valve.



If a stuck EFE valve doesn't loosen after lubricant is applied, replace the valve.

To check the valve itself as a potential cause of rough idle, reach under it while the engine is idling and push its diaphragm up until the valve opens and the engine idle becomes rougher yet, or the engine dies. Wear a glove to protect your hand.

If no change is noted, the valve may be leaking, causing the rough idle. If you should find that the valve is faulty, it will have to be replaced.

If your engine detonates severely under light-throttle acceleration, the EGR valve may have a broken diaphragm that prevents it from opening, or the valve itself or the passages to it may be clogged. This condition must be corrected before it leads to serious internal engine damage.

Before you condemn the EGR valve, however, make sure it gets a supply of vacuum at 2,000 rpm with the engine warm, and inspect exhaust-gas passages in the valve and intake

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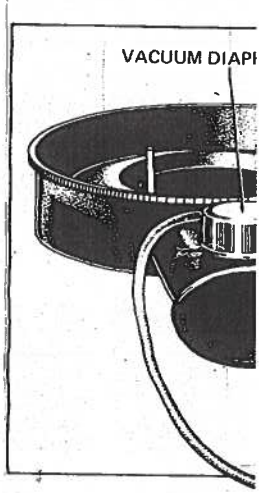

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EFE and MHCV

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To check a GM EFE valve

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**3. If this doesn't happe
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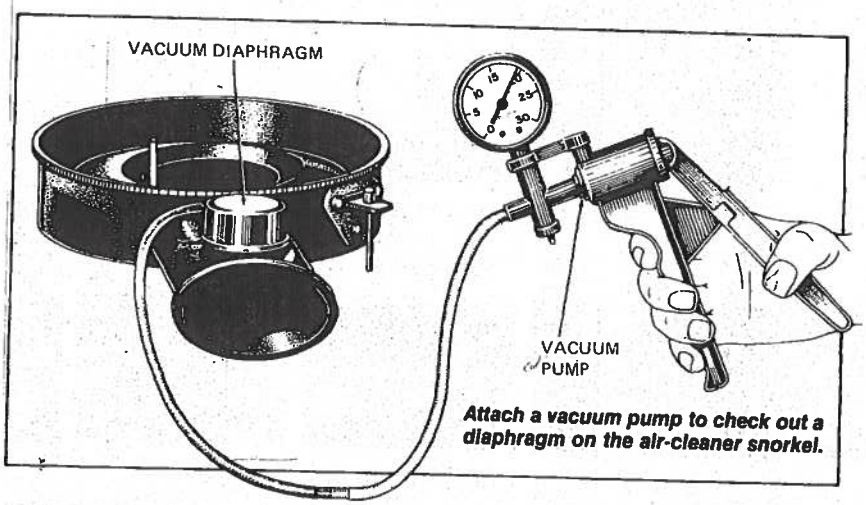
CAR CARE GUIDE

SECTION 2. ROUGH IDLE



Attach a vacuum pump to check out a diaphragm on the air-cleaner snorkel.

manifold to be sure they're not restricting the flow of gas to the valve.

EFE and MHCV

EFE valves are used primarily by GM on some models with V6 engines, such as the X-body cars (Citation, Omega, Phoenix and Skylark).

The EFE valve serves the same purpose as the manifold heat-control valve on other cars—it provides instant heat to the engine induction system for rapid fuel vaporization and good cold-engine operation.

Unlike a manifold-heat-control valve, operated by a thermostatic spring in the exhaust manifold that contracts and expands according to engine heat, the EFE valve is controlled by a thermal vacuum switch (TVS) that passes vacuum to the valve when the engine is cold. Vacuum closes the valve, allowing heat to concentrate where it assists fuel to vaporize. When the engine warms, the pull of vacuum is released and the valve opens. The much-more-common manifold-heat-control valve serves the same purpose. Its thermostatic spring holds it closed. Exhaust heat opens it as the engine warms.

From this description it may seem obvious that a malfunctioning EFE valve or manifold-heat-control valve could make an engine stall or idle roughly only when the engine is cold. But obvious isn't always accurate.

Damaged EFE and manifold-heat-control valves that stick in the closed position permit good cold-engine operation. However, the engine will stall or idle roughly when it causes excessive heat to be concentrated on fuel. Instead of vaporizing normally, fuel will practically evaporate.

To check a GM EFE valve, do this:

1. See that the engine is cold and locate the EFE valve.

2. Start the engine and watch the valve. You should see the actuator link being pulled into the diaphragm housing. This action closes the valve.

3. If this doesn't happen, shut off the engine, remove the hose from the valve and apply at least 8 in. Hg of vacuum to the valve with a hand vacuum pump. If the linkage doesn't move, apply a manifold-heat-control-valve lubricant. If it still doesn't work after a shot of lube, replace the valve.

To check the manifold-heat-control valve—if you're in the majority, your engine has one—do this:

1. See that the engine is cold.

2. Find the valve counterweight under the exhaust manifold. Try to move it.

3. If the valve is stuck, apply manifold-heat-control-valve lubricant to the counterweight pivot point and tap the counterweight lightly with a plastic-headed hammer. Try moving the counterweight again.

Unless you've neglected valve maintenance for a long time, the valve should loosen. If it doesn't, you may have to remove the manifold and replace the valve. Once the valve is free to operate, start the engine and watch the counterweight as the engine warms. It shouldn't flop open instantly, but should open gradually as the engine warms.

How to control a carburetor vacuum leak

In seeking a reason for a modern engine stalling or idling roughly, don't overlook some old standbys, one of which is a vacuum leak. A key spot where a leak may develop is at the carburetor/intake manifold joint.

To keep a leak from developing here (or to get rid of one that has developed), periodically tighten carburetor mounting bolts. Also, tighten all carburetor assembly screws. You can verify whether the joint is sealed by following this procedure:

1. Connect a tachometer.

2. Start the engine.

3. Eject SAE 30-weight engine oil from a squirt-type oil can around the base of the carburetor. If the tachometer needle rises, indicating an increase in engine speed, oil has been sucked into an empty space, sealing it momentarily. A vacuum leak

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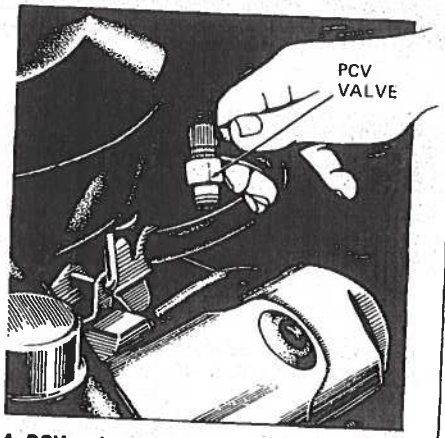
exists. If tightening bolts doesn't fix the problem, replacing the carburetor-base gasket may.

Testing fuel-injection delivery

Stalling or rough idling of a gasoline engine with a fuel-injection system will usually result when one injector fails. This can also occur if ample fuel pressure is not delivered to the injectors. This lack of pressure can result from a weak fuel-delivery pump, partially clogged fuel filter or a restriction in the fuel-delivery line.

Without proper equipment, the removal, testing and overhauling of injectors is difficult, but checking fuel delivery isn't. Using a typical



A PCV valve that won't rattle when you shake it is shot and should be replaced.

throttle-body-injection (TBI) system as an example, here's how to do it:

1. Bleed pressure from the injection system. You do it by removing the fuel-pump fuse from the fuse panel and cranking the engine for about 30 seconds.

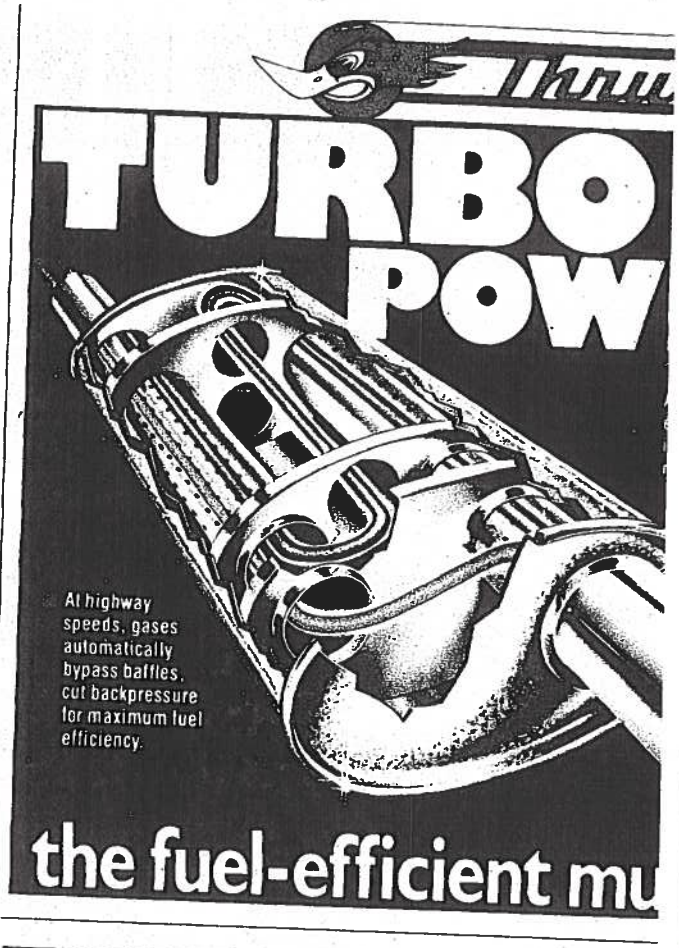
2. Break the fuel-line connection at the fuel inlet.

3. Using a tee, install a fuel-pump pressure tester in the fuel-line connection point.

4. Crank the engine. The pressure tester should record the fuel pressure specified by the manufacturer. For example, the new Pontiac 2.5-liter TBI engine requires at least 9 pounds per square inch (p.s.i.). If it doesn't get this much, not enough fuel will reach the injectors.

Caution: Gasoline will probably drip when the fuel line is disconnected. Try to collect it in a container or absorb it in a rag. It's wise to keep a fire extinguisher handy when you do this. You should have one for your shop in any case.

If you do collect any spilled fuel with a rag or paper towels, don't leave them lying around. Not only are such rags dangerous, but fumes of evaporating gasoline are highly explosive. Obviously, don't smoke while you're doing this and keep the work area well ventilated. **PM**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Three times World Driving Champion.
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